The Maryland Fruit Grower

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FRUIT AND FOLIAGE INJURY

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(continued from last month)

Bordeaux Injury

Bordeaux is one of the oldest of sprays used by fruit growers. Although it is an excellent fungicide it has contributed its quota of spray injury. The typical injury of the leaves first appears as purple spots which later turn brown. Later the entire leaf may turn yellow or bronze and finally drop off. The injury to the fruit varies from a slight corking or russeting of the lenticles and roughening of the finish to a pronounced netting and russeting of the entire surface. The destruction of the cuticle and outer cells stimulates the formation of corky cells which gives rise to the russeted area. The damage to the cuticle causes loss of moisture, poor keeping quality and an unattractive finish on the fruit. This injury may develop soon after the spray is applied or progressively as the season advances.

Bordeaux injury is caused by slight amounts of copper which become soluble and enter the tissue under certain favorable conditions. Experience has shown that the original formulas contained more copper than was necessary and that by reducing the copper and increasing the lime, less injury was obtained. This led to the 6-8-100, 4-8-100, 2-6-100 and 1½-4½-100 sprays. While the 4-8-100 formula now recommended in Maryland has been found to be reasonably safe, it has not entirely eliminated spray injury. Conditions which seem to favor Bordeaux injury are: (1) Cold, damp, foggy or rainy weather immediately following the application. (2) Heavy dripping sprays. A fine mist spray which does not deposit the spray in large drops gives better coverage, dries more quickly and causes less spray injury. (3) More injury is obtained from Bordeaux sprays when the leaves and fruits are small, before they have developed a waxy cuticle. For this reason Bordeaux is not recommended until the first or preferably the second cover spray. (4) High pressures of 400-600 lb. also tend to increase the injury. (5) Variety susceptibility is an important factor. Golden Delicious is very susceptible. Grimes, Jonathan, Delicious, Stayman, Rome and York seem to show a decreasing tendency in the order named. McIntosh shows considerable resistance.

Summary of the Causes of Spray Injury

Considerable spray injury to young foliage is caused by applying strictly dormant sprays after the buds have broken. The selection of a spray material depends on the tenderness of the buds, leaves and fruit as well as on the stage of development of insects and diseases. Know the limitations of the materials used, and apply them under the most favorable weather conditions. There is less danger of spray injury when the spray dries on the trees rapidly and when the temperature is not above 85-90° F. A fine mist spray which

does not form large drops on the leaves, dries more quickly, gives better coverage and causes less injury than a heavy dripping spray. Guns or nozzles with high pressures of 400-600 lbs. cause injury if held too close to the leaves and fruit. The use of wettable sulphur in after bloom sprays or weak Bordeaux for summer sprays where bitter rot, Brooks fruit spot or blotch are not important tends to reduce spray injury. If spray injury is avoided the fruit develops a waxy cuticle, which improves the finish, prevents water loss from fruits and prolongs the keeping quality.

COMPETITION OF CROPS WITH YOUNG APPLE TREES

By A. Lee Schrader
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Under the title "Root Development of Apple Trees", Professor W. W. Yocum addressed the Nebraska State Horticulture Society in January, 1935. Some of his remarks and conclusions are given here to see how they apply to our conditions and if we have similar problems. His studies dealt with the effects of cultural practices, such as mulching, cultivation, intercropping, sod mulch and fertilizers on the root development of young Delicious apple trees during the first three years after planting.

To quote Professor Yocum:

"The importance of the roots of our fruit trees has been generally under-estimated in relation to all orchard practices. Although in the handling of trees under most situations the first results are obtained upon the roots. Such orchard operations as transplanting, cultivation, fertilizing and cover cropping, influence the roots directly and the tops indirectly. The factors in the soil environment, as soil moisture, soil structure and texture, acidity, organic matter and the water table, influence the roots more directly than they do the tops.

"In spite of all this the top part of the tree has been and will continue to be most used to measure results or indicate the condition of the tree; First, because they are easier to measure; and second, because roots are of little economic value of themselves alone. However, we should appreciate the importance of the root system and its relation to the well-being of the tree. . . .

"The most ideal root system for most plants, I think we can safely assume, is one which occupies the largest volume of soil, from which it can draw an abundance of moisture and food. In a humid climate or a wet location we would expect and usually do find that fruit trees are shallow rooted. In less humid regions such as ours, fruit trees are more deeply rooted." . . .

"I should explain that the apple trees used in all these studies were all Delicious trees of one nursery grade, 11/16 inch. They were selected carefully from the nursery stocks in order to have them as uniform as possible. Trees were chosen which had their roots evenly distributed on all sides.

"These trees were planted about the middle of April, 1932, and pruned back uniformly to a leader and one lateral branch. About one-half of them were planted at Lincoln, and the others at the University Fruit Farm at Union in loose soil. This enables us to get a comparison between the effects of the soil and climate of the two locations. Clean cultivated trees were grown in each location. At Lincoln the trees under

Clean cultivation with no cover	Good growth of tree but soil getting in *poor tilth and washed away by rains.*
Sod up to 3 feet of trees	*Very marked reduction in size of tree.*

Particularly it should be noted that June 1 seeding of the cover crop has markedly reduced the size of the trees during 3 years of the development of the orchard, compared with later seedings or with cultivation with no cover crop. This effect of the cover crops on growth of the young tree is very similar to the effects noted by Yocum with corn planted as an intercrop close to the trees. The competition of tree and cover crop is especially important during June since most of the terminal growth of the tree is made during this month. By July 1, terminal growth in length is slowing down or completed and cover crops growing after this date have less chance of competing intensively with tree growth. However, in view of Yocum's good results with a cover crop 7 feet away from the tree, it is possible that early covers can be planted in young orchards if kept at least 6 feet from the tree. This also accounts for the good results obtained by strip cultivation along the tree row while some permanent cover grows between the rows.

Cover crops such as cowpeas or millet or weeds started July 1, frequently may not give good stands of cover crop growth. Better results are secured by sowing rye and vetch September 1 to 15. However, to quickly build up a soil in the young orchard a double cover cropping, that is, a planting of an early cover JUN 1 or earlier at 6 feet distance from the young tree followed by rye and vetch September 1, seems to be a very good solution of the problem. In the cover crop experiments, millet, cowpeas and soybeans have each been used as June 1 covers plowed down September 1 and immediately seeded to rye and vetch with excellent stands of both crops except that rye and vetch did better following cowpeas or soybeans. Control of erosion is greatly assisted by such double cover cropping.

Comparing sod with cultivation showed that a grass sod has marked effect in reducing young tree growth. Thus a cover during the entire season competed most seriously with the young tree. Strip cultivation is essential to avoid such bad effects under sod.

In all cases, fertilizers were necessary to maintain satisfactory growth of cover crops.

LOOKING AROUND

In general, the apple bloom in Maryland has been rather heavy with most varieties in the heavy blooming class. Weather during bloom was, for the most part, bright and warm, with good bee flight. Conditions were not so good for scab development with the exception of a rainy period on May 3 and 4.

The peach trees in Central and Eastern Maryland bloomed in good shape. In the Hancock and Smithsburg sections the winter injury to leaf buds was rather heavy. In some orchards, especially those where trees were weakened from various causes, during the past few years, leaf buds were scarce after blossoming was over, but the trees were trying their best to push out every leaf bud that showed any life. Those growers who applied nitrate early in the spring observed that leaf buds were more vigorous and a little more numerous than on trees where nitrate was applied late.

HAVE YOU READ THE ADVERTISEMENTS?

MORE ABOUT APPLE COSTS

From time to time, we have printed whatever cost of production figures were available, with the caution that these figures were only averages, but worth considering as a guide. In the August, 1935 Journal of Economic Entomology, M. S. Troth and G. Edward Marshall, entomologists at Purdue (Indiana) Agricultural Experiment Station discussed the costs of controlling apple insects and diseases in a 200-acre orchard in southern Indiana, with an annual production of 57,000 bushels. The records cover an eight year period (1926-1933). During this period there has been a considerable decrease in prices; two years were favorable to scab; four years were optimum for codling moth; three years were very dry, while three were very wet. The figures show above average codling moth and lighter than average disease and other insect infestation.

Insect and Disease Control Costs as Compared to Total Cost

Item	*Total cost per bushel*	*Chargeable to insect and disease control*	*Chargeable to codling moth*
Spray material	12.4c	12.4c	10.54c
Spray labor	4.3	4.3	3.12
Thinning	4.5	3.1	2.32
Worming trees	3.1	3.1	3.10
Supervision	3.3	2.4	1.80
Grading	2.8	1.8	1.62
Scraping trees	1.3	1.3	1.30
Banding	.9	.9	.90
Pruning	2.2	.9	.85
General supplies	.8	.6	.45
Gas and oil	.6	.5	.45
Light and power	.5	.4	.36
Bait traps and emergence cages	.3	.3	.30
Repairs	.5	.3	.25
Screening packing shed	.2	.2	.20
Cultivation	.8	.2	.20
Depreciation of special equipment	8.3	5.4	4.59
Miscellaneous	2.2	1.5	1.12
	Cost A	Cost B	Cost C
	49.00c	39.60c	33.47c
All other costs	28.75c		
Total costs	77.75c	39.60c	33.47c

In the table, the first column shows total costs, while the second column shows how much of that cost is chargeable to insect and disease control, and the third column shows how much of the insect and disease costs are chargeable to codling moth alone.

The column showing all other costs includes baskets, caps, liners, fertilizer, picking, cover crops, and some miscellaneous charges.

Thinning was done to remove defective apples, to break clusters and lighten the load, but sometimes 3 trips were made over the orchard to take off wormy apples. Also the trees were wormed to remove any codling moth

News Letter- May, 1936

With attendance reduced owing to rush of spray applications, a group of Maryland fruit growers met at Frederick on Friday, May 11, to discuss the plan of advertising outlined by Appalachian Apples, in cooperation with the growers of Pennsylvania, West Virginia and Virginia. Mr. C. E. Bryan, Chairman, stated that the growers would either have to advertise, or cut production by tree removal. Mr. Lloyd Balderston explained the plan of Appalachian Apples. Mr. G. S. L. Carpenter stated that the U. S. apple production averaged about 100 million bushels, of which usually about 20 million bushels were exported. Last season the exports were reduced, and the domestic market was flooded. With no advertising, the apple sales suffered while other fruits took the lead in clever and well-financed plans of advertising. Orchard removal is painful, unless the orchards are in bad shape. Good growers should do all possible to advertise apples, and Mr. Carpenter urged the growers to consider the Appalachian plan and to correct any objectionable things that were included in the present plan, so that Maryland representatives could bring these to the attention of the Board of Directors.

It was voted to enter the Appalachian Apples plan. Mr. A. H. Nofsinger suggested that the County Agricultural Agents could help contact growers. Mr. A. F. Vierheller stated that Dr. T. B. Symons, Director of the Extension Service, had offered the services of the Extension forces in assisting with the work of interesting growers in the plan. Thanks were expressed to Dr. Symons by unanimous vote. Mr. Vierheller gave some details as to the system of county meetings to be held to explain the advertising plan to growers in Maryland and to have them join it.

Three directors were elected to represent Maryland on the Board of Directors of Appalachian Apples. Those elected were: C. E. Bryan, Lloyd Balderston, and G. S. L. Carpenter. Each of the four states will have three directors on the Board. There followed a discussion to limit the advertising only to growers who packed a high quality pack. It was decided to instruct our directors to suggest that Appalachian Apples labels be used only on Extra Fancy, Fancy, and U. S. Number One, or its equivalent, but to have growers agree to contribute to the fund, on the basis of their Utility pack and above.

Mr. J. A. Cohill reported pledges of growers in the Hancock section totalling 222,000 bushels, based upon conservative crop estimates. Mr. E. D. McCain moved that the directors be instructed to report to the Board that the sentiment of the growers was that we work toward keeping all fruit below Utility grade off the fresh fruit market using it for by-products only. This was unanimously adopted. It was agreed that this was a difficult problem, but possible by an educational campaign and growers' self-interest, so that in time, Appalachian Apples would be favorably known, and demanded by buyers.

Before adjournment, Mr. Bryan urged the growers to take more interest in the Horticultural Society, and to strengthen it to where it would better serve the fruit industry of Maryland.

Briefly, the advertising plan, as it now stands, will be that each grower agrees to contribute 1/2¢ per bushel on apples of Utility grade and above actually packed or sold in bulk, produced in 1936. He estimates his probable crop, now, and pays 1/5 of the total assessment at once for current expenses of running the Appalachian Apples plan. He then pays 1/2 of the total on or before November 15 and the remainder by February 15. He pays only on actual crop sold, as early estimates will be revised as the season progresses. This is a fair plan and can do much to publicize and help to move the apple crop, as well as put the apple back into its rightful place in the American diet.

Read This

It takes money to issue the Maryland Fruit Grower, and to carry on the various functions of the Horticultural Society. Is your membership in the Society worth one dollar a year? If not, please write and suggest improvements. You'll feel better if you become an active member. Right now, send in your dollar, if it has not been done. Ask your spray material, paper, and basket supply man to advertise in the Maryland Fruit Grower. Get into the apple advertising plan and let's all work for better conditions in the fruit industry.

The Crop

The peach foliage is growing better and there is brighter hope for the Maryland peach crop. Give those trees a little more nitrate of soda if they seem to need it. There are reports, here and there, of late cold injury to apples and peaches, also varying degrees of set, in spite of heavy apple bloom. These confused reports should merely encourage us to take good care of the crop, and be ready to offer some real good fruit to the buyer when he is ready for it.

Due to serious drought conditions, the Maryland strawberry crop is in very poor condition. Growers in the Norfolk, Virginia, section have, in many cases, stopped picking.

Note

A Cutler grader used one year, is available at great saving. If interested, write A. F. Vierheller, College Park, Md., for particulars.

The Summer Meeting

Preliminary plans are being made to hold the annual Summer Field Meeting of the Maryland State Horticultural Society in late June, possibly June 25th, although this is not final. Make your plans to be present. According to present plans, the meeting will probably be held at the University of Maryland Horticultural Farm, and the U. S. Horticultural Field Station, just across the road. These farms are located on the Washington-Baltimore Boulevard, (U.S. Route #1), near Beltsville, about 3 miles north of College Park, and about 28 miles south of Baltimore. There will be plenty to see, and lots to enjoy. Don't miss this.

A. F. Vierheller,
Extension Horticulturist.

May 16, 1936.

larvae hiding in cracks, etc. There has been no depreciation of trees included, but the total trees are valued at $33,000, and depreciation is set at 3%, or $1,000 per year. Washing has not been included. In short, this orchard may be a little unusual, as many unusually careful operations were carried on to control codling moth, but the figures are worth considerable study, for codling moth is a serious pest.

BULLETIN ABSTRACTS

FERTILIZER EXPERIMENTS IN THE MORANTHAU ORCHARD: SIX YEARS RESULTS WITH NINETEEN TREATMENTS.

N. Y. State Exp. Sta. Bul. 661. January, 1936
By R. C. Collison and L. C. Anderson

This report presents six years results in fertilizing a McIntosh orchard in the Hudson River Valley. The soil is classified as a Merrimac gravelly sandy loam, and one rather low in productivity. The experiment was started in 1929 with 14 year old trees, and was continued until 1935.

The comparative value of different nitrogen carriers was stressed, and the treatments included eight different nitrogen carriers. Both medium and heavy applications of five carriers, namely; nitrate of soda, sulphate of ammonia, Cyanamid, calcium nitrate, and urea were included, while some of the trees also received lime. In the case of nitrate of soda, the medium application consisted of four pounds, and the heavy application of seven pounds per tree. The equivalents in nitrogen were used in the other above named carriers.

Combinations of nitrogen with phosphorus and potassium also were included. All fertilizers were applied each year during the first ten days in April.

Tree Size: Every fertilizer treatment significantly increased the size of the trees, as measured by trunk circumference gains, over no treatment. Also in each of the above named nitrogen carriers the heavier application significantly increased the size of the trees over the lighter application. All carriers were about equally efficient in promoting growth gains.

Tree Yield: All fertilizer treatments produced significantly higher yields than the no treatment plot.

Of further interest is the fact that no significant differences in yield resulted between the single applications of nitrate of soda, sulphate of ammonia, Cyanamid, calcium nitrate and urea. Whether all these carriers would give equivalent results on different soil types and with different varieties are points yet to be determined and are now receiving attention by these authors.

In some cases the heavier applications of nitrogen gave increased yields over the lighter ones, but in no case was this increase significant, whereas significant gains in tree growth resulted in all five of the heavier applications compared to the lighter ones.

Neither phosphorous as superphosphate, ammo-phos or nitrophoska, or potash in the form of muriate, increased yields apparently.

The authors conclude that "during six years, an expenditure of 8 cents

per tree per year gave an annual increase of 2.3 bushels of apples per tree for the four nitrogen carriers, nitrate of soda, sulphate of ammonia, calcium nitrate and Cyanamid.—Abstracted by I. C. Haut.

SOIL EROSION IN CALIFORNIA: ITS PREVENTION AND CONTROL

Calif. Agr. Exp. Sta. Bul. 538, August, 1932
By W. W. Weir

This bulletin contains many excellent photographs showing the effects of erosion in fields and orchards. The causes as well as the effects are considered. Stating that "erosion, or the carrying away of material by moving water, is governed by the amount of water, the slope of the land, and the obstacles which are placed in the way of its free movement", methods designed to prevent and control it are presented. Contour cultivation for annual crops, strip cropping, and various types of terraces receive particular consideration. Erosion protection in cultivated orchards is also discussed with the conclusion that "probably the best type of erosion protection for a square or triangular hillside orchard is a dense cover crop". Although written primarily to meet California conditions this bulletin contains much pertinent information for orchardists everywhere.—Abstracted by I. C. Haut.

RASPBERRY VIRUS DISEASE CONTROL

The causes of "running out" of raspberry and blackberry plantings, has been found due to virus diseases, such as streak, mosaic and curl. There is no control for these diseases except to remove the affected plants, and to use only disease-free stock in planting. New plantings should be set at least 20 rods away from old plantings. At Ohio Station where disease-free plants are grown for sale as certified plants, the diseased plants are first scorched with a kerosene blow-torch to destroy the insects which might fly away and spread the disease. Then the plants are dug out and burned. Spraying is becoming an essential in blackberry and raspberry diseases, but there are certain diseases that are checked only by careful removal of diseased plants at frequent intervals.

APPALACHIAN APPLES

It is not necessary to use space to report that there is an organized effort being made to start an effective apple advertising plan in Maryland, Pennsylvania, West Virginia and Virginia, sponsored by the Horticultural Societies of those states. The full details of the formation and developments of the plan will be given in the next issue of the Maryland Fruit Grower.

SOIL CONSERVATION

Orchard cover crops and soil improving crops will be eligible for consideration under the new Soil Conservation program. The details are too lengthy to be given here, but fruit growers should consult their county agricultural agents in regard to the benefits of this program, in the orchard soil management plans.

HAVE YOU PAID YOUR 1936 DUES?